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Between Scylla and Charybdis - On the Place of Economic Methods and Concepts within Ecological Economics

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Abstract: Ecological Economics inherently faces a challenge akin to sailing between Scylla and Charybdis. In Greek mythology these are two monsters located on opposite sides of a narrow strait, and falling victim to one or other of them is unavoidable. In the recurring process of establishing and refining its conceptual foundations, Ecological Economics runs the risk of, on the one hand, losing important insights by trying to be radically different from mainstream economics and, on the other hand, becoming a redundant appendix to mainstream environmental economics by routinely applying its concepts and methods. We argue that avoiding both fallacies is possible by using Ecological Economics' orientation towards sustainability as a guiding principle. The scientist's power of judgment supports her decision concerning which methods are suitable for tackling a given sustainability problem. The intersubjective quality of judgment prevents the resulting methodological pluralism from drifting toward arbitrariness.

Keywords: ecological economics, methodological pluralism, power of judgment, ontology, sustainability

1. Introduction

"[…] a diversity of methodologies is appropriate and pressures to eliminate methodologies for the sake of conformity should be avoided" (Norgaard 1989: 37)

Almost every other year, Ecological Economics (EE) is said to stand at a crossroads: Spash (1999), Müller (2003), Gowdy and Erickson (2005) and again Spash (2013: 351) have all asserted at regular intervals that EE is facing crucial choices: choices about what kind of science EE is and on what methodological, philosophical and ideological premises it should be based. But behind the more specific questions lies one fundamental issue: how should EE relate to mainstream economics? This question reflects a tension that has repeatedly shaped the history of modern EE (Røpke 2005). It is no wonder, then, that EE encounters the same crossroads again and again: how different should EE be compared to mainstream economics in terms of concepts, methods and their underlying premises?

So far, scholars working in EE have not found a unanimous answer to this question. Both supporters and resolute critics of mainstream methods have conducted research under the EE label. In practice, EE has displayed a wide methodological pluralism.[1] Various approaches have been proposed for justifying (Norgaard 1989) or systemizing (Baumgärtner et al. 2008) this methodological pluralism in EE. Recently, however, it has also drawn heavy fire: Anderson and M'Gonigle (2012: 43) have argued that there is a "*façade of methodological pluralism that masks [the] dominance [of neoclassical economics]*". Furthermore, Norgaard's plea for methodological pluralism, cited above, has been attacked as "*somewhat flawed*" (Spash 2012: 45) in that, among other things, it delivers only "*an argument against prescriptive epistemology [but] not the elimination of some methodologies per se*" (ibid: 40). What these critics are proposing, then, is to retain a degree of methodological diversity within EE but also to structure and limit this pluralism in a way that excludes the bulk of mainstream economic methodology from EE.

In this paper, we visit the crossroads once again, framing it as a challenge to navigate between two extremes which one would rather wish to avoid. On the one hand, in trying to be radically different from mainstream economics EE risks losing important insights and useful concepts. On the other hand, by routinely applying established economic concepts and methods it risks becoming a redundant appendix to mainstream economics.[2] Hence the title's reference to Scylla and Charybdis, the two monsters from Homer's Odyssey located on opposite sides of a narrow strait: falling victim to one or the other is unavoidable. In the recurring process of establishing and refining its conceptual foundations, EE runs the risk of either inappropriately including or inappropriately excluding (parts of) mainstream methodology. This yields the obvious question: is there a way to avoid both dangers and, if so, how can it be done?

We hope to advance the discussion in two steps. First, we contrast and analyze the two opposing lines of argument that lead to either fundamental rejection or unquestioned acceptance of mainstream methodology. In doing so, we demonstrate that both extremes rest on weak foundations. To be explicit here: we do not advocate a middle position for its own sake or merely in order to reconcile different factions. Rather, we show that there is no universally valid line of argument which proves mainstream methods *per se* to be correct or flawed. Second, we argue that EE is characterized by its focus on sustainability and that judgment is necessary to decide which methods are suitable for tackling a given sustainability problem. The eminent work of Kant (2000 [1790]) on the "*power of judgment*", i.e. a person's capacity to relate specific cases to general rules and categories, is helpful in clarifying the epistemological status of such methodological decisions based on judgment. Our perspective is thoroughly context-based and shares similarities with Pragmatic Philosophy (e.g. Bromley 2008), in that we treat mainstream

[1] It is worth noting that not only EE as a whole but also a single study may exhibit and benefit from methodological pluralism (Nijar et al. 2010).

[2] Røpke (2005: 287) has already made a similar observation for EE: "*One risk is that the field becomes uninteresting as a field, if identity is lost by the acceptance of anything as being justified because of transdisciplinarity. […] Another risk (others would call it a chance) is that the field loses its bite and becomes a sub-field of neoclassical environmental and resource economics modelling links between ecosystems and the economy.*" In relation to Røpke's first risk we focus more specifically on the relation of EE to mainstream methodology.

methodology as a toolbox that is useful in certain instances while being of no use (or even harmful) in others. We therefore maintain that EE is best served by a methodological pluralism that, in principle, does not preclude methods from mainstream economics.

At this point, some clarification is necessary: what is actually mainstream economic methodology? In our view, it seems fair to define mainstream methodology as that which gets published in leading journals of the discipline. Flicking through any one of these journals seems to confirm Lawson's (2006: 491) verdict that the "*insistence on mathematical-deductive modelling*" as an "*essential feature of recent and current mainstream remains intact*". This methodological insistence on mathematical formalism is part of the overall paradigm of mainstream economics: following Kuhn (1962), a paradigm consists of the ensemble of values, methods and so forth, which is neither explicitly debated nor challenged in any way but taken for granted within a community. For instance, the normative theory of utilitarianism arguably constitutes another crucial element of the mainstream's paradigm.[3]

The rest of this paper is structured as follows: we contrast two opposing lines of argument on mainstream methodology in Section 2 and then scrutinize them in Section 3. Against this background, Section 4 reviews a number of essential characteristics of EE, particularly its orientation towards sustainability problems, and lays out the concept of the "*power of judgment*" as a principle that prevents methodological pluralism from drifting toward arbitrariness. Section 5 summarizes and draws conclusions.

2. Two opposing views about mainstream economic methodology

2.1. Line of argument I: Mainstream methodology is fundamentally flawed, so EE needs to be radically different from mainstream economics

In a much-cited passage, Blaug (1997: 3) diagnosed mainstream economics with having an obsession for formal tools that distracts the discipline from addressing genuinely relevant questions: "*Modern economics is sick. Economics has increasingly become an intellectual game played for its own sake and not for its practical consequences for understanding the economic world*" (Blaug 1997: 3). Several critics contend that since Blaug's diagnosis, nothing has really changed. In particular, "*mathematical methods are being imposed in situations for which they are largely inappropriate*" (Lawson 2006: 493), as the formal models employed seldom adequately reflect multilayered social systems.

In order to fully appreciate this position we need to dig deeper here: what determines the (in)appropriateness of particular methods? Following Lawson (2003), a method is appropriate if it suits the nature of the phenomenon it is intended to analyze. This implies the assumption of an

[3] Naturally, by indicating what counts as beyond debate within the mainstream, one enters contested terrain. For instance, mainstream economists often resort to strategies of self-immunization by referring to the diversity of strands within the discipline, thereby displaying "perverse resilience" (Green 2014). At the same time, some critics brush aside different currents within economics by pointing to a "neoclassicism" whose purported hyper-dominance transforms theoretical failure into discursive strength (Arnsperger and Varoufakis 2005). Against this background, we refrain from giving all-encompassing definitions and rather concentrate on the mainstream's methodological focus.

objective reality which is to be approximated by scientific methods. Compared to the thoroughly instrumentalist stance of mainstream methodology (Friedman 1953), which favors usefulness over realism in models, Lawson thus performs an "*ontological turn*" (Lewis 2003): the reasons for approving or rejecting any given method are to be found in the structure of reality itself.

So why has mainstream methodology, according to the ontological perspective, got it fundamentally wrong? Because the deductive-mathematical modeling it employs does not fit the actual structure of reality. Specifically, the prevailing kind of formalistic modeling is only appropriate for closed atomistic systems. Social phenomena in general should be presumed to derive from open, dynamic, interconnected and organic, structured and emergent systems. "*In other words, the ontological presuppositions of these methods do not everywhere match the nature of social reality*" (Lawson 2006: 502).

Similarly, Anderson and M'Gonigle (2012) contend that mainstream methods are inappropriate for analyzing and solving the problems which EE addresses. They sense "*a contradiction at the core of ecological economics, a contradiction between mainstream means and heterodox ends, with a confused space in between*" (Anderson and M'Gonigle 2012: 39). Spash (2012: 41) perceives mainstream economics as a monist field of "*close-minded formalists employing outdate behavioural psychology to defend an unrealistic position*".

Based on this dire diagnosis, the critics' recommendation is straightforward – EE should sever its links with mainstream economics and rely on alternative methods which better match social reality: "*For example, in order for the old idea of a fully-informed, rational, atomistic agent to be replaced by the complex, fallible, multiply motivated agent requires dropping mathematical formalism, which acts as a constraint and perverts concepts*" (Spash 2012: 41). In contrast, continued use of mainstream economic approaches is "*detrimental to developing an alternative economic vision*" (ibid.: 46).

The very possibility of cooperating with mainstream economists is questioned as well. Collaborative work done by mainstream economists and ecological economists at Stockholm's Beijer institute, for example, is cited as a failed attempt at cooperation, or worse, as an example of a hostile take-over of EE by mainstream economists (cf. Herman Daly's comment cited in Røpke 2005: 272). In consequence, there seems to be no basis for collaborative work: "*[…] rational debate with neoclassicists is a lost cause. It is as productive as asking a car mechanic to fix the engine's carbon-spewing exhaust by getting rid of the private automobile. [...] A reinvigorated ecological economics must leave behind the compromises of its history"* (Anderson and M'Gonigle 2012: 39).

In conclusion, this first line of argument contends that EE should abandon the bulk of mainstream methodology for ontological reasons and should rather strive for more radical concepts and methods that cannot be hijacked by mainstream economists.

2.2. Line of argument II: There is nothing inherently wrong with mainstream economic methodology – established concepts and methods can and should be routinely applied

In 2012, the German Network for Pluralism in Economics addressed an open letter to the *Verein für Socialpolitik* (German Economics Association, GEA), criticizing the lack of pluralism (of theories and methods) in current mainstream research and teaching as well as its unquestioned acceptance of normative assumptions. In particular, the letter highlighted the mainstream's tendency to treat mathematics as an end in itself instead of a mere tool – a practice which lends itself to concealing normative assumptions. The GEA's (2013) answer to this letter may serve as a representative example of how many mainstream economists react to such criticisms. Identifying three reproaches, namely i) monist and dogmatic spirit within the discipline, ii) inappropriate focus on mathematical formalization and iii) intolerance against new approaches and methods, the GEA answered as follows.

First, economics is not to be confused with an ideological belief in the self-regulating powers of the market. The aim of economics is to analyze the allocation of scarce resources; decentralized markets just happen to be the best allocation procedure. Second, formal modeling constitutes an important but not exclusive component of economic methodology. Since the problem of allocating scarce resources is first and foremost a quantitative one, formalization is indispensable in clarifying the choice between different alternatives. Third, the critics basically draw a caricature of economics. For instance, the alleged adherence to the *homo oeconomicus* as a distorted representation of human behavior is no longer (if it has ever been) correct: behavioral economics includes psychological research and previous standard assumptions such as logical consistency and interpersonal independence are steadily replaced. Furthermore, all models are, by definition, wrong; they are not intended to represent all aspects of reality. Instead, the point of models such as the *homo oeconomicus* is to structure our thoughts.

Consequently, this second line of argument is confident that the mainstream's toolbox of concepts, methods and instruments may be adequately applied to the kind of sustainability problems at the core of EE. Consider the case of climate change: van den Bergh (2012: 2) holds that internalizing all climate externalities would deliver sustainable climate policy – whether all existing externalities are taken into account "*is not so much a conceptual-theoretical as a practical-empirical problem*". Although "*the mainstream economic view on externality regulation is not accurate*" (ibid.) in that it neglects complicating factors such as technological lock-in, taking these complications into account would suffice: "*Without environmental externalities the problem of unsustainability vanishes*" (van den Bergh 2010: 2051). From this perspective, then, formalistic methods developed to analyze these standard economic concepts are not problematic. In addition, this view comes very close to the mainstream's line of defense that any deviation by real world environmental policy instruments from the economic textbook is not the latter's fault (e.g. Sinn 2011).

In sum, the second line of argument rejects the methodological critiques and emphasizes the applicability of mainstream concepts and methods to the issues relevant to EE. As regards the alleged inherent flaws of mainstream methodology, these either refer to dated models which have

been or are being rebuilt within the mainstream itself or else they relate to practical problems of implementation that are not conceptual problems *per se*.

3. Evaluation

3.1. Assessing line of argument I: The "*ontological critique*" of mainstream economic methodology is misleading

Line of argument I rests on the premise that mainstream methodology is based on flawed ontological assumptions. In consequence, EE is advised to define and work with different assumptions, discarding mainstream methodology in toto. Should EE perform such an ontological turn? We disagree for three reasons.

First, the idea of a readily available ontological consensus as a foundation for EE is questionable. Who is to determine the appropriateness of ontological views? Are we likely to agree on the "*nature of reality*" and appropriate perceptions thereof? Arguably there is no such consensus within EE. For instance, in order to achieve consensus on the claim that an ontological hierarchy exists, it is not sufficient to refer to the biophysical constraints of social life: while Spash (2012: 42) argues in this way, he also cites Tacconi (1998: 99) who, in contrast, believes that "*there are good reasons for adopting a relativist ontology*", albeit in a way that accounts for "*biophysical limits to social life. However, these limits are interpreted differently by different actors*". In other words, while biophysical limits to human life represent one of the central tenets of EE, this does *not* necessarily translate into ontological consensus. To understand this, consider also the following statement by Røpke: "*[T]here are limits to the material growth of the economy. It is a core belief that these limits have to be taken seriously and that several environmental problems are critical*" (Røpke 2005: 267, emphasis in original). Røpke refers to a core belief – which has more to do with the researcher's attitude than with an ontological assumption about the nature of reality. We will elaborate further on the characteristics of EE in Section 4 below.[4] For the moment, the important point is that different philosophical stances are compatible with the core beliefs of EE: this may well include realism, constructivism and other, more specific philosophical attitudes (e.g. unrepresentative realism).

Second, consensus on ontological questions is not sufficient for methodological consensus. Assuming, for the sake of argument, that there is an ontological consensus within EE, would that imply a consensus on methodological issues? This cannot be taken for granted. Indeed, van

[4] The insistence on biophysical restrictions on economic activity has turned out to be a blunt weapon against mainstream myopia: the "Daly/Georgescu-Roegen vs. Solow/Stiglitz" debate from 1997 shows that economists do not deny biophysical restrictions as such. Instead, they tend to declare them irrelevant for the specific issues at hand. When pressured to declare whether he accepts the Second Law of Thermodynamics, Solow (1997: 268) answered: *"No doubt everything is subject to the entropy law, but this is of no immediate practical importance for modeling what is, after all, a brief instant of time in a small corner of the universe"*. So rather than putting forward the supposedly higher-ranking ontological status of the Second Law of Thermodynamics as compared to socially constructed norms, EE might do better to insist that, whatever its ontological status, the Second Law matters – right here, right now.

Bouwel (2003: 85) argues that one should beware of committing the "ontological fallacy: taking an a priori ontological stance which transposes or reduces epistemological and methodological matters into an ontological matter." In other words, ontological considerations are not capable of providing us with "the right method" and neither can they function as a "final arbiter" in deciding methodological issues (Vromen 2009). Even if two researchers hold exactly the same convictions about ontological issues, they might nonetheless disagree about the particularities of a given case and therefore about the most appropriate method to apply.

Third, consensus on ontological issues is not necessary for methodological consensus. Consider, for instance, two researchers, one a critical realist and the other a constructivist, who deeply disagree on the philosophical question "Is there one single objective reality?" At the same time, however, they may agree on a specific methodological issue. Assuming, for example, that both view climate change as a problem of intergenerational justice, both might criticize the mainstream approach of framing the problem as an exercise in discounting future costs and benefits; yet their agreement on how to conceptualize climate change does not exclude differences on the above-mentioned philosophical question.

So far, we have argued that ontological differences should not overly concern us. Against this background, how are we to assess Lawson's critique of mainstream methodology? Lawson contends that the formal models applied in mainstream economics do not match the social reality of complex, open systems, which the models are meant to approximate. At the same time he also carefully points out that he is not opposed to mathematical formalism *per se*. His critique is directed instead at the widespread "abuse" of such modeling, that is, its application for purposes considered as inappropriate. In fact, we fully agree with Lawson (2004: 337-339, cited in Lawson 2009) when he writes: "*[…] I do not suggest that formalistic methods be excluded for methodological options on offer. But I do insist that methods of mathematical-deductivist reasoning (like any other tools) have limits to their usefulness, and that this be recognized and respected*".

The issue, then, is this: how are we to assess the usefulness of a method? While Lawson judges the appropriateness of a method by its capacity to precisely capture certain features of the real world, one might also hold a more instrumental view (cf., e.g., Reiss 2012a). From such a perspective, models are tools that derive their value from practical usefulness rather than representational accuracy. For instance, accepting the premise of social systems as open systems does not preclude the use of closed models "*[…] to help understand an open reality*" (Hodgson 2009: 184). Indeed there is lively scholarly debate about the explanatory power of formal models (Reiss 2012b, 2013) and their general characteristics: formal economic models have been variously interpreted as metaphors (McCloskey 1983), as Galilean thought experiments (Cartwright 1999), as credible counterfactual worlds (Sugden 2000) and as heuristics (Hodgson 2009).

The gist of the preceding discussion is that reducing the evaluation of mainstream methodology to a high-level comparison with a predetermined set of ontological assumptions is extremely restrictive. Formal models may be considered useful in a variety of ways and EE would not do justice to the relevant methodological discussions (cf. Hausman 2012) by dismissing formal

economic modeling as inherently inadequate. Such a move, it should be recalled, would also run counter to Lawson's own argument that formalistic methods should *not* be removed from our methodological inventory but should rather be recognized as limited in their usefulness. Moreover, as the next section makes clear, the reference to ontology is not required for a substantial critique of mainstream methodology.

In sum, the thrust of argument I, which calls for a thoroughgoing methodological break between EE and mainstream economics, rests on a rather weak foundation. Even if mainstream methodology abuses formalistic methods, these methods might still be adequately applied in some contexts. The diagnosis that mainstream economics is obsessed does not entail the conclusion that mathematical formalism in EE should be avoided at all costs. Below we will argue that formal models may contribute to EE as long as they are not used as ends in themselves but serve a clear purpose.

3.2. Assessing line of argument II: An instrumentalist critique of mainstream economic methodology

In Section 3.1 we refuted the claim that mainstream methodology is to be rejected on ontological grounds. In the following, we demonstrate that from an instrumentalist perspective there is still substantial reason to criticize mainstream methodology. In doing so, we show that a critique of mainstream methodology need not necessarily be aligned with particular philosophical assumptions. Since Friedman's (1953) famous methodological essay is often invoked as that seminal piece of work which underlies mainstream practice, we proceed by reviewing how its two main claims relate to our overall assessment. These claims are: i) a theory should be judged by its predictive value and not by the realism of its assumptions and ii) "*[…] positive economics is, or can be, an 'objective' science, in precisely the same sense as any of the physical sciences*" (Friedman 1953: 4).

First, formalization in economics has become an end in itself rather than a tool. We tap only very briefly into the vast literature that substantiates this claim. For instance, Mirowski (1989) dissects the neoclassical obsession with transforming economics into a "*social physics*" via copying mathematical methods from 19th century physics. Another example from within mainstream economics itself is Ellison's (2002) model, where peer review procedures create and perpetuate a trend towards formalization: referees' comments mostly focus on improving the technical aspects of a submitted paper rather than considering the relevance of its research question. In consequence, economists spend ever more time polishing the mathematical finesse of their work at the expense of developing relevant research questions. Ultimately, the key piece of evidence comes from Friedman himself, who complained that "*[e]conomics has increasingly become an arcane branch of mathematics*" (Friedman 1999: 137). That Friedman should write this is somewhat ironic given that he himself may have contributed to this development:[5]

[5] There is no consensus on this question; see the discussion in Hands (2003).

> *"Friedman's methodological views […] still serve as a way of avoiding awkward questions concerning simplifications, idealizations, and abstraction in economics rather than responding to them" (Hausman 2012).*

Importantly, the fact that Friedman's arguments have been used by many economists as a legitimation for engaging in empty formalism does not imply that a particular ontological stance (=realist, non-instrumentalist) is necessary for criticizing mainstream practice. On the contrary, judging the appropriateness of formal models by their practical usefulness will often lead to the conclusion that mainstream work does not live up to its own alleged methodological standards (cf. Reiss 2012a: 380). The very point of instrumentalism is to value a given model or theory by assessing its capacity to explain or help us understand something or simply to structure our thoughts in novel and better ways – and these functions cannot be completely detached from the plausibility of assumptions. In sum, mainstream methodology, by transforming formalistic modeling into an end in itself, actually opposes the thrust of instrumentalism.

Second, the mainstream's stance towards normativity is questionable. Since the very beginnings, a tendency to switch attitudes can be observed: "*As far back as Gossen, neoclassicals have wavered between claiming that they were describing actual behavior and claiming that they were prescribing what rational behavior should be*" (Mirowski 1989: 236). The tendency to sidestep critique by shifting between different points of view is combined with and facilitated by an adherence to a strict fact-value dichotomy, as proposed by Friedman (1953). The claim is that economics can separate the positive analysis of how people behave from the normative question of how they should behave (e.g. which policies to implement in order to maximize social welfare). It seems plain to us, however, that these two dimensions cannot be neatly separated and that "*moral entanglements*" are inescapable (Sen 1987, Sandel 2013).

Let us illustrate this argument by examining the concepts of efficiency and externality. Mainstream economics concentrates on Pareto efficiency of allocations and routinely implies that everyone should support efficiency enhancing measures regardless of their specific value judgments because the former simply increase overall welfare. However, as demonstrated by Le Grand (1990: 560), efficiency is "*a secondary objective that only acquires meaning with reference to primary objectives*". The problem is that a vaguely normative use of efficiency may serve to occlude alternative (e.g. non-utilitarian) perspectives, so a disclosure of underlying primary (normative) objectives is vital (cf. Strunz 2012).

Externality is a descriptive concept; the internalization of externalities yields allocative efficiency. But sustainability is more than internalization of externalities (Baumgärtner and Quaas 2010, Common 2011): sustainability is a normative concept that is built on considerations of justice towards current and future generations and justice between humans and nature (Baumgärtner and Quaas 2008). Consequently, reducing sustainability to thin concepts such as internalization of externalities or non-declining utility is problematic (cf. Howarth 2007).

In sum, we argue that the above-mentioned critique voiced by the Network for Pluralism in Economics (2012) is justified: mainstream methodology treats formalism as an end in itself and this inclination naturally lends itself to glossing over normative assumptions. Who would oppose

an allocation that was quantitatively proven to be more efficient? Who would not support the internalization of environmental externalities? However, formalization may obfuscate the inherent normativity of concepts such as "efficiency" and "sustainability".

3.3 Interim conclusion

Summing up, we deem neither of the opposing lines of argument convincing. First, regarding the ontological critique of mainstream methodology, we do not propose that questions concerning the fundamental vision of EE should remain unaddressed. However, we do believe that it is wrong to consider answers to ontological questions as *a priori* presuppositions from which *all* epistemological and methodological assumptions then ensue. Such an attitude has been referred to as the "*ontological fallacy*" (Van Bouwel 2003). Researchers should make their perspectives on humans and nature explicit – but these pre-analytic commitments can only serve as a first heuristic step in research processes (Vromen 2009). As a result, mainstream methodology cannot be "rejected" or "approved" as a whole. Second, mainstream methodology exhibits a problematic attitude towards formalism and normativity. On the one hand, EE would therefore be ill advised to copy mainstream concepts and methods without duly scrutinizing their applicability. On the other hand, mainstream methodology itself is evolving, particularly in the area of empirical economics (cf. Angrist and Pischke 2010). Therefore, we contend that there is no inherent obstacle to accommodating mainstream approaches within EE's methodological repertoire.

4. Judging the appropriateness of methods within Ecological Economics

4.1. Ecological Economics as a *problem-oriented* scientific movement

In many traditional scientific disciplines, including mainstream economics, what is regarded as a valid scientific problem is usually defined from inside the scientific community and judged against standards that are intrinsic to that discipline, for example the use or development of certain methodologies (Kuhn 1962). In contrast to this EE was, from its very beginnings, oriented towards tackling problems stemming from outside the scientific realm. That is, societal needs and demands are a relevant – if not the most relevant – source for defining a valid problem within EE. Moreover, these problems are normative ones. Costanza (1991) emphasized these issues by entitling his early compilation of founding contributions "*Ecological Economics: The science and management of sustainability*". Interestingly, Costanza characterized EE not only as a science but also as a certain practice for coping with sustainability problems. In other words, transdisciplinarity (Pohl and Hirsch Hadorn 2007) and an orientation towards sustainability problems can be considered to be constitutional characteristics of EE.

Following this argument, the use of a specific methodology or an assemblage of methodologies is not an appropriate way of demarcating EE from mainstream economics or constructively defining it (cf. Baumgärtner et al. 2008). Similarly to other problem-oriented applied sciences such as the engineering sciences, medical science, and jurisprudence, the methods employed need to match the real-world problems to be tackled. Thus the benchmark against which a certain methodology should be judged is its usefulness or appropriateness for understanding, analyzing or solving the specific sustainability problem at hand. In order to describe the traits of EE, then, it is necessary to explore the characteristics of sustainability problems.

4.2. Characteristics of sustainability problems

Obviously sustainability encompasses a huge variety of issues. Nevertheless, it is possible to identify typical characteristics of sustainability problems. Following Faber (2008) and Klauer et al. (2013; 2013a: 55) a number of key points can be identified that, notwithstanding differences in detail, the various approaches to conceptualizing and operationalizing sustainability have in common:

- At the heart of sustainability is a demand for *intra- and intergenerational justice*. It addresses the fact that the way people (above all in the prosperous countries) currently live and work leads to serious problems over the long term. Many of the adverse consequences of our way of life are already distributed unequally within our current generation, but future generations in particular will also be affected by them.

- *Long-term perspective*: Sustainability implies that the long-term effects of today's actions are a key criterion for assessing policy options. This follows from the demand for intergenerational justice.

- *Comprehensive and integrated approach*: Problems relating to sustainability need to be assessed in a comprehensive and integrated manner rather than from a sector-based perspective alone.

- *Preserving nature*: Most concepts of sustainability share the idea that the quality of what is bequeathed to succeeding generations must satisfy certain requirements, in particular, that a specific quality standard of nature needs to be preserved. Occasionally there are also calls to acknowledge an intrinsic value of nature, that is, a moral value that is independent of nature's usefulness to human beings.

These features of sustainability entail a number of consequences for EE. It is necessary to deal with complexity, uncertainty and ignorance. The knowledge base for tackling sustainability problems has to be broad, encompassing scientific knowledge from different disciplines as well as practical and idiosyncratic knowledge. Methodological pluralism is welcome, if not necessary. As a consequence EE should be inter- and transdisciplinary by nature (cf. Pohl and Hirsch Hadorn 2007). In other words, EE itself is not a normal discipline defined strictly by its own paradigm in the sense of Kuhn (1962) but rather a post-normal science (Funtowicz and Ravetz 1993): it is not characterized by a consistent, clearly defined set of assumptions, approaches and methods. Rather, EE is characterized by its object: sustainability problems. Nevertheless, the way these problems are addressed should be scientific in a general sense – that is, method-based, communicable and intersubjective.

How can these methodological challenges imposed by the nature of sustainability problems be tackled in an appropriate manner? Decisions on the appropriateness of a method for addressing a sustainability problem are thoroughly context-dependent. There is no one-method-fits-all solution. In our view, the key concept here is the *power of judgment* as systematically expounded by Immanuel Kant (2000 [1790]).

4.3. Power of judgment

The power of judgment is the capacity to apply general concepts and insights to specific, contingent situations (for the following discussion, see also Klauer et al. 2013, 2013a). It is a crucial step in all kinds of decision making but is needed even at the stage of recognizing, for example, an object that consists of a trunk and branches as "a tree". Judgment is needed to distinguish between relevant and irrelevant knowledge and to apply abstract scientific findings to real-world problems. Kant argued that the power of judgment proceeds by starting out from something specific and reflecting on the general type(s) under which it can be subsumed. The power of judgment incorporates two complementary elements, namely, "heuristics" and "intuition":

- *Heuristics*: Judgment does not deduce but seeks and finds, i.e. it proceeds heuristically (Ancient Greek: *heuriskein* = to find). When seeking a good solution to a problem a heuristic offers rules of thumb and guiding principles for orientation. In contrast to scientific laws that are subject to the idea of general validity, the rules and principles of a heuristic allow for (some) exceptions: "The exception proves the rule." We call such guiding principles and rules "bridging principles" because they relate specific situations to general laws, scientific knowledge and the like (cf. Albert 1991, Klauer et al. 2013: Sec. 7.6.2). A heuristic is a system of bridging principles that constitute a method for seeking solutions.

- *Intuition*: It is not sufficient to have a heuristic; its proper application is crucial. Judgment demands a feeling for the situation. By 'feeling' we do not mean an emotion but rather a sense or intuition, as in the phrase "My feeling is that something is amiss." Intuition offers us a vague idea of what to do when reason fails to provide clear advice. Admittedly such intuitions may be unreliable and deceptive. However, while experienced scouts can rely on their sense of direction, greenhorns may get lost even if they have a map. A sense of orientation additionally needs practice and experience. Some talent is needed too. Because intuition is based on talent as well as experience it remains subjective and vague.

The power of judgment is a capacity – a characteristic trait of an individual (Kant 2000 [1790]: 99, 100, §8; Oakeshott 1991: 15). Nevertheless there are two factors that make judgment objective to a certain degree:

1. Kant argues (2000 [1790]: 173, 174, §40) that a person making a decision knows that it is a personal decision she is making. In order to ensure that her decision is the right one, she seeks dialogue with others, hoping that they will agree with her. However, she can only expect agreement if she has tried to anticipate and consider the views of others beforehand. By adopting the perspective of others, a certain "intersubjectivity" enters the decision making process.

2. The bridging principles mentioned above bring to judgment a second aspect of objectiveness: their applicability and usefulness can be communicated and debated among

a group of people involved in making a decision. Agreement on their helpfulness indicates a degree of objectivity.

4.4. Power of judgment and EE

So how can judgment help us in deciding whether or not some economic concept or method is appropriate? According to the procedure outlined above, exercising judgment in order to assess the appropriateness of a given economic method means applying criteria to specific situations. As it turns out, relevant criteria have already been proposed. For instance, the difference between relative and absolute scarcity separates the realm of economic methodology from a realm in which standard economic concepts are not appropriate (Baumgärtner et al. 2006). Focusing on the example of biodiversity and its conservation, the authors show that the divide between relative and absolute scarcity runs right through this issue. On the one hand, biodiversity conservation deals with relative scarcity, in that each conservation policy carries opportunity costs; hence economic methods are useful to ensure the non-wastefulness of policies. On the other hand, biodiversity is partly characterized by non-substitutability and multi-functionality, which rules out the application of economic approaches. It is crucial to appreciate that the watershed between both realms is not objectively given: the necessary distinction is "*impossible to make solely on objective grounds*" (Baumgärtner et al. 2006: 495) because it involves subjective value judgments. Similarly, Kallis et al. (2013) argue that the question of whether the monetary valuation of nature is acceptable cannot be usefully answered in a universal way. Instead, the authors "*propose a reformulation of the question into 'when and how to value money?' and 'under what conditions'*" (ibid.: 97). To that end they lay out a decision framework consisting of four criteria under which a monetary valuation of nature is admissible (environmental improvement, distributive justice, plural value-articulating institutions, no neoliberal commodification). Obviously, these criteria derive from very specific value judgments; also, there is no objective way to decide whether some measure can be expected to meet a given condition. In conclusion, the appropriateness of economic methods must be resolved for specific contexts, following more general criteria and guiding principles. The involved value judgments should be made explicit.

The inherent subjectivity of judgment, then, should not lead us to fear a relativist nightmare where methodological decisions are based purely on idiosyncratic whims: the power of judgment comprises an intersubjective dimension, which implies discursive rationality (Schnädelbach 1998). In other words, meaningful methodological debate is possible because researchers need to justify their decisions by offering reasons for why they adhere to some particular belief. This procedure of giving reasons for the beliefs one entertains has been referred to as "*volitional pragmatism*" (Bromley 2008). Thus addressing methodological problems by means of the power of judgment might be interpreted as a pragmatic route forward for EE.

To sum up, EE should not be defined by the use or rejection of certain methods but by (i) a focus on sustainability problems and (ii) the way these problems are conceptualized. This includes acknowledging the specific characteristics of sustainability problems such as complexity, uncertainty (cf. Faber et al. 1992, 1998, Sigel et al. 2010) and long-term dynamics (cf. Faber et al. 2005, Fischer et al. 2014) while also acknowledging that such problems occur in emergent

systems that are open, dynamic, interconnected, organic and structured. It also entails maintaining a degree of openness towards methods and approaches from other disciplines and incorporating different perspectives on nature and human beings as well as their respective normative foundations (Klauer et al. 2013, 2013a).

5. Conclusion

It has been claimed that EE risks being absorbed by mainstream environmental economics. EE would be rendered irrelevant in that the mainstream keeps on dominating public discourse with policy advice based on neoclassical assumptions: "*If ecological economics is to have a future worth having, its real contribution will surely lie in both dismantling the hegemony of neoclassical economics and in helping to move to a post-hegemonic (post-capitalist) exploration of what can and must take its place*" (Anderson and M'Gonigle 2012: 43). We agree that the dominance of neoclassical economics should be overcome. However, this does not imply an outright rejection of every concept and method that originates from the mainstream. We believe that the severity of sustainability problems will slowly but surely diminish the hegemony of neoclassical economics and will advance the prominence of EE. Nevertheless, it is worthwhile pointing out the mainstream's ideological blind spots. Indeed, EE's explicit normative foundation – its focus on sustainability – can be positively employed to demarcate EE from allegedly neutral economics. In contrast to neoclassical environmental economists' denial of an explicit ethical stance, EE scholars do actively address ethical questions. Ilge and Schwarze's (2009) empirical investigation demonstrates that a recognizable EE "school of thought" that is distinct from environmental economics has already developed.

Our methodological perspective also has implications for the question of the extent to which standard economic instruments may be advocated: decisions must be context-based because universal answers are not available. For instance, there are many examples where markets or economic instruments erode moral norms (e.g. Bowles 2008, Falk and Szech 2013), so a societal debate about their specific appropriateness is needed (Sandel 2012). However, this does not imply that economic instruments are essentially immoral and have no place within a policy mix for sustainability in general or biodiversity and ecosystem governance in particular, to refer to the above-mentioned example of biodiversity conservation (Vatn et al. 2011). From an evolutionary perspective (Ring 1997), policies may well include economic instruments so as to foster sustainability in the long run – even if the "internalization of externalities" is not sufficient conceptually (cf. Section 3.2).

Let us return to the metaphor introduced in our title. In Homer's Odyssey, Circe counsels Odysseus to sail closer to Scylla because it is "better by far to lose six men and keep your ship than to lose your entire crew". Accordingly, two questions arise: First, is there a way for EE to pass through the strait without incurring damage? We hope that this can be answered affirmatively, having pointed out the possibilities of determining the (non-)applicability of economic methods in different contexts. Second, which strategy risks more seriously damaging EE – eschewing mainstream economic methods and concepts as such (in order to separate EE from economics) or routinely adopting mainstream economic methods (in order to change economics from the inside)? Of course, the answer to this question will depend on a person's

subjective valuation and judgment. But it is precisely because this dependence on values exists in the context of decision making that we insist there is an appropriate place for mainstream economic methods within the methodological diversity of EE. We doubt that conducting a kind of methodological cleansing would have a beneficial impact. Rather, EE might benefit from different perspectives because "*there is a tremendous dynamic energy found in embracing the tensions of our unique location*" (Nelson 2009: 7). Ultimately, the decisive criterion for whether or not a given economic method should be used is its suitability in tackling the sustainability problem at hand. It is the scientist's power of judgment that endorses the selection of methods and prevents methodological pluralism from drifting toward arbitrariness.

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